SEISMIC PROPERTIES OF ECLOGITES FROM MINERAL LATTICE PREFERRED ORIENTATIONS

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Eclogites may be a source for the bright and continuous seismic reflectors that appears on deep seismic reflection profiles. In order to better understand lithospheric structures, it is therefore necessary to better constrain the mechanical behaviour and anisotropic physical properties of these rocks.By studing the lattice-preferred orientation (LPO) of the eclogite-forming minerals (omphacite, garnet, rutile...) we calculate the seismic properties of these rocks. LPO measurements were obtained using a scanning electron microscope equipped with an electron back scattered diffraction system (EBSD). The samples come from different localities (Alps, Norway, Mali...) and are representative of various type and intensity of eclogites deformation.Calculated seismic properties are controlled by the omphacite LPO with [001] crystallographic axis oriented parallel to lineation and [010] normal to foliation. The mean P-wave velocity of the studied samples is generally high (Vp8 km/s) and P-wave anisotropy is weak (AVp3%). The minimum P-waves velocity is normal to the foliation and the maximum within the foliation plane. Calculated S-waves velocities are around 5 km/s and anisotropy is also moderate (AVsmax5%).From these seismic velocities, the reflectivity of various horizontal lithological interfaces involving eclogite are calculated. An eclogite/crust interface is a very good reflector (Rc0.2) whereas an eclogite/peridotite interface is weakly reflective (Rc*0.05). A petrologic Moho (eclogite/peridotite) could therefore remain invisible to vertical seismic reflections techniques, whereas an eclogite body embedded in crustal rocks could appear as a bright seismic reflector.